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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/944,499	08/30/2001	Salman Akram	3936.1US (99-0066.1)	4371
24247	7590	04/19/2004	EXAMINER	
TRASK BRITT P.O. BOX 2550 SALT LAKE CITY, UT 84110			CHAMBLISS, ALONZO	
			ART UNIT	PAPER NUMBER
			2827	

DATE MAILED: 04/19/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/944,499	AKRAM ET AL.	
	Examiner Alonzo Chambliss	Art Unit 2827	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 20 January 2004.
- 2a) This action is **FINAL**. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-3,5 and 7-31 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 1-3,5 and 7-31 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 22 September 2003 is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All b) Some * c) None of:
1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____. |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>18</u> . | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| | 6) <input type="checkbox"/> Other: _____. |

DETAILED ACTION

1. Amendment B filed on 1/20/04 has been fully considered and made of record in Paper No. 19.

Information Disclosure Statement

2. The information disclosure statement (IDS) submitted on 12/03/03 in Paper No. 18 was filed before the mailing date of the final rejection on 4/14/04. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Response to Arguments

3. Applicant's arguments with respect to claims 1-3, 5, and 7-31 have been considered but are moot in view of the new ground(s) of rejection.

In regards to Kikuchi lacking the type of adhesive for the stabilizer. Kikuchi discloses that an adhesive is used to bond the stabilizer between two semiconductor component see paragraph 41. The adhesive would be non-conductive (i.e. a dielectric material), since the adhesive it is not use for electrical connection between the two semiconductor component which can clearly be seen by Figs. 3a-3c and 5).

In regards to Kikuchi lacking express or inherent description that the glass epoxy resin from which support members 6 thereof may be formed is a photo-curable material see Okubura et al. (US 2004/0047539) paragraph 121.

In regards to Kikuchi failing to disclose a plurality of superimposed, contiguous, mutually adhered layers, each of which comprises dielectric material. Hashimoto is relied upon to disclose a plurality of superimposed, contiguous, mutually adhered layers, each of which comprises dielectric material.

In regards to Kikuchi failing to disclose contact pads that are arranged substantially in-line with other contact pads and proximate to a centerline of the circuit board. Kikuchi discloses contact pads that are arranged substantially in-line with other contact pads and proximate to a centerline of the circuit board 2 (see Fig. 5).

In regards to the motivation for combining the teachings of Kikuchi and Kuniaki. The examine recognizes that references cannot be arbitrarily combined and that there must be some reason why one skilled in the art would be motivated to make the proposed combination of primary and secondary references. In re Nomiya, 184 USPQ 607 (CCPA 1975). However, there is no requirement that a motivation to make the modification be expressly articulated. The test for combining references is what the combination of disclosures taken as a whole would suggest to one of ordinary skill in the art. In re McLaughlin, 170 USPQ 209 (CCPA 1971). References are evaluated by what they suggest to one versed in the art, rather than by their specific disclosures. In re Bozek, 163 USPQ 545 (CCPA) 1969. In this case, Kikuchi and Kuniaki both disclose stabilizers between two semiconductor devices with solder bump connections. Kuniaki provides for at least one stabilizer 12 to be configured so that voids do not occur in the insulative underfill material 15 when the insulative underfill material 15 is flowed into the space created when the substrate 2 is connected with the semiconductor device 3,

since if voids were present in the insulative underfill material 15, the underfill material would not reinforce the solder connection (see English translation, paragraph 24, Fig. 14). Therefore, it would have been obvious to incorporate stabilizers to prevent voids in an underfill with the device of Kikuchi, since the stabilizers allow the underfill material to reinforce the solder connection which improves the stability of the semiconductor package as taught by Kuniaki. Therefore, this rejection is made **final**.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1-3, 5, 7-11, 13-22, 24, 25, and 72-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kikuchi et al. (JP 11-40608) in view of Hashimoto (U.S. 6,410,366).

With respect to Claims 1, 9, 13, 16, 20, 25, 29, and 31, Kikuchi discloses a substrate 2 having a surface with contact pads 2b exposed thereto, wherein the contact pads 2b being configured to be connected with conductors 5a on a surface of another semiconductor device component 5. Each contact 5a of the semiconductor device component 5 being arranged substantially in-line with a plurality of other contact pads 5a and positioned proximate (i.e. close to or in the vicinity) to a centerline of the substrate 2. At least one nonconductive stabilizer 6 (i.e. epoxy resin) and adhesive protruding from the surface and positioned between a periphery of the surface and each contact pad 2b exposed to the surface and including a plurality of at least partially superimposed, contiguous, mutually adhered layers of dielectric material. The stabilizer has an elongate element, which extends in a direction parallel to the surface of the substrate 2. The adhesive serves as one dielectric layer and the epoxy resin serves as the second layer of dielectric material (see English translation, paragraphs 26, 41, 60, 86, and 87; Figs. 3a-3c, and 4-6). Kikuchi fails to explicitly disclose mutually adhered layer of the same type of dielectric material. However, Hashimoto discloses a support 11, 21 having mutually adhered layer of the same type of dielectric material (see col. 5 lines 41-46 and col. 7 lines 5-9). Thus, Kikuchi and Hashimoto have substantially the same environment of dielectric support structures between two semiconductor devices. Therefore, it would have been obvious to substitute the mutually adhered layer support

for the support of Kikuchi, since the mutually adhered layer would provide reliable support for the substrate while allowing for the proper spacing between two semiconductor devices as taught by Hashimoto.

With respect to Claims 2, 14, 15, 21, and 27, Kikuchi discloses wherein the at least one stabilizer 6 protrudes from the surface a distance no more than a distance that at least one conductive structure 4 to be disposed in contact with at least one of the contact pads 2b that extends beyond the surface while permitting the conductive structures 4 on the contact pads 2b to contact the conductors 5a of the other semiconductor device component 5 (see paragraph 26; Fig. 3a-3c).

With respect to Claims 3 and 28, Kikuchi discloses wherein the at least one stabilizer 6 protrudes from the active surface a distance that permits conductive structures 4 on the contact pads 2b to contact the conductors 5a of the semiconductor device 5 (see Fig. 3a).

With respect to Claims 4, 5, 17, and 30, Kikuchi discloses wherein the at least one stabilizer 6 comprises an epoxy resin (see paragraph 87). It is inherent in the composition of epoxy resin that it is photo curable.

With respect to Claims 7 and 18, Kikuchi discloses wherein the at least one stabilizer 6 is positioned proximate a corner of the active surface 2a (see Fig. 4).

With respect to Claims 8 and 19, Kikuchi discloses wherein the at least one stabilizer 6 has a cross-sectional quadrilateral shape (see Figs. 4 and 5).

With respect to Claim 10, Kikuchi discloses further comprising protruding

conductive structures 4 in contact with selected ones of the contact pads 5a (see Fig. 3a-3c).

With respect to Claims 11 and 22, Kikuchi discloses wherein the conductive structures 4 comprise of solder bumps (see Figs. 3a-3c and 4-6).

With respect to Claim 24, Kikuchi discloses wherein the at least one stabilizer 6 maintains a substantially uniform distance between the surface of the substrate 2 and the surface of the other semiconductor device component 5 (see paragraphs 64-74; Figs. 3a-3c).

6. Claims 12 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kikuchi et al. (JP 11-40608) and Hashimoto (U.S. 6,410,366) as applied to claims 1 and 13 above, and further in view of Sato (U.S. 6,287,895).

With respect to Claims 12 and 23, it is well known in the semiconductor industry that a substrate comprises a semiconductor wafer with a plurality of dices thereon as evident by Sato (see col. 5 lines 16-39; Figs. 5, 6A, and 6B). Therefore, it would have been obvious to have substrate with a semiconductor wafer having a plurality of dices thereon with the device of Kikuchi- Hashimoto, since substrate would allow several devices to be created simultaneously which reduces the production time of the devices as taught by Sato.

7. Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kikuchi et al. (JP 11-40608) and Hashimoto (U.S. 6,410,366) as applied to claims 1 and 13 above, and further in view of Kuniaki et al. (JP 10-189653).

With respect to Claim 26, Kikuchi fails to disclose wherein the at least one stabilizer is configured so that voids do not occur in an insulative underfill material when the insulative underfill material is flowed into a space created when the substrate is connected with the other semiconductor device component. However, Kuniaki discloses wherein the at least one stabilizer 12 is configured so that voids do not occur in the insulative underfill material 15 when the insulative underfill material 15 is flowed into the space created when the substrate 2 is connected with the semiconductor device 3, since if voids were present in the insulative underfill material 15, the underfill material would not reinforce the solder connection (see English translation, paragraph 24, Fig. 14). Therefore, it would have been obvious to incorporate stabilizers to prevent voids in an underfill with the device of Kikuchi, since the stabilizers allow the underfill material to reinforce the solder connection which improves the stability of the semiconductor package as taught by Kuniaki.

Double Patenting

8. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

9. Claims 1-3, 5, and 7-31 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 6 of U.S. Patent No. 6,649,444. Although the conflicting claims are not identical, they are not patentably distinct from each other because the instant application and the patent both claim a substrate with bonding pads with a space or stabilizer including a plurality of superimposed, contiguous, mutually adhered layers.

The prior art made of record and not relied upon is cited primarily to show the product of the instant invention.

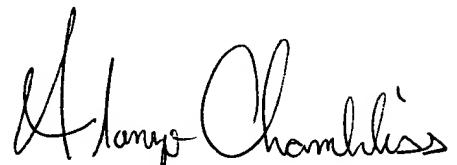
Conclusion

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning the communication or earlier communications from the examiner should be directed to Alonzo Chambliss whose telephone number is (703) 306-9143. The fax phone number for this Group is (703) 308-7722 or 7724.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-7956



Alonzo Chambliss
Primary Patent Examiner
Art Unit 2827

AC/April 14, 2004